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SOIL MOISTURE

SOIL MOISTURE CHARACTERISTICS

of Some Lower Coastal Plain Soils

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SOIL MOISTURE CHARACTERISTICS OF SOME LOWER COASTAL PLAIN SOILS ¹

By F. Leslie Long, Joe M. Daniels, Frank T. Ritchie, Jr., and C. M. Ellerbe ²

A knowledge of the amount of water retained by a soil in a form that is available for growing plants is valuable to farmers, designers of drainage or irrigation systems, and research workers interested in soil-plant relationships. To plan properly for the management and efficient use of water, it is necessary to know how much available water a given soil holds. Plants will suffer from drought quicker on soils with limited available water capacity than on soils of higher capacity. Water management systems, including the removal of excess water or replenishing deficient moisture supplies, should be based on a knowledge of the soil moisture characteristics and other physical properties of the soil. Therefore, the consideration of the moisture characteristics of a given soil to be drained or irrigated is essential to the planning of a successful operation.

SOILS STUDIED

The soils included in this study are selected from the Lower Coastal Plain of Georgia and South Carolina. Very little information on soils of this area is presently available. The two principal criteria used in the selection of these soils were their agricultural importance and their quantitative occurrence. The eleven soil series included in this study and the Great Soil Groups to which they belong are: Regosol--Lakeland and Klej; Red-Yellow Podzolic--Goldsboro, Irvington, Charleston, Fairhope, and Dunbar; Low-Humic Gley--Edisto and Weston; Ground-Water Podzol--Leon; and Kiawah. The results presented herein are from one site of each series. Figures 1 and 2 show where soil samples were obtained. The numbers appearing on the maps are used in the tabular data and soil profile descriptions to identify the soil samples and location sites. Future plans call for sampling more sites of each series to determine the variation from site to site within a soil series.

SAMPLING PROCEDURE

Samples were collected by digging a pit approximately 4 feet by 5 feet and to a depth of 40 to 60 inches depending upon the soil. Each horizon was sampled as the pit was dug. A Uhland

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GEORGIA

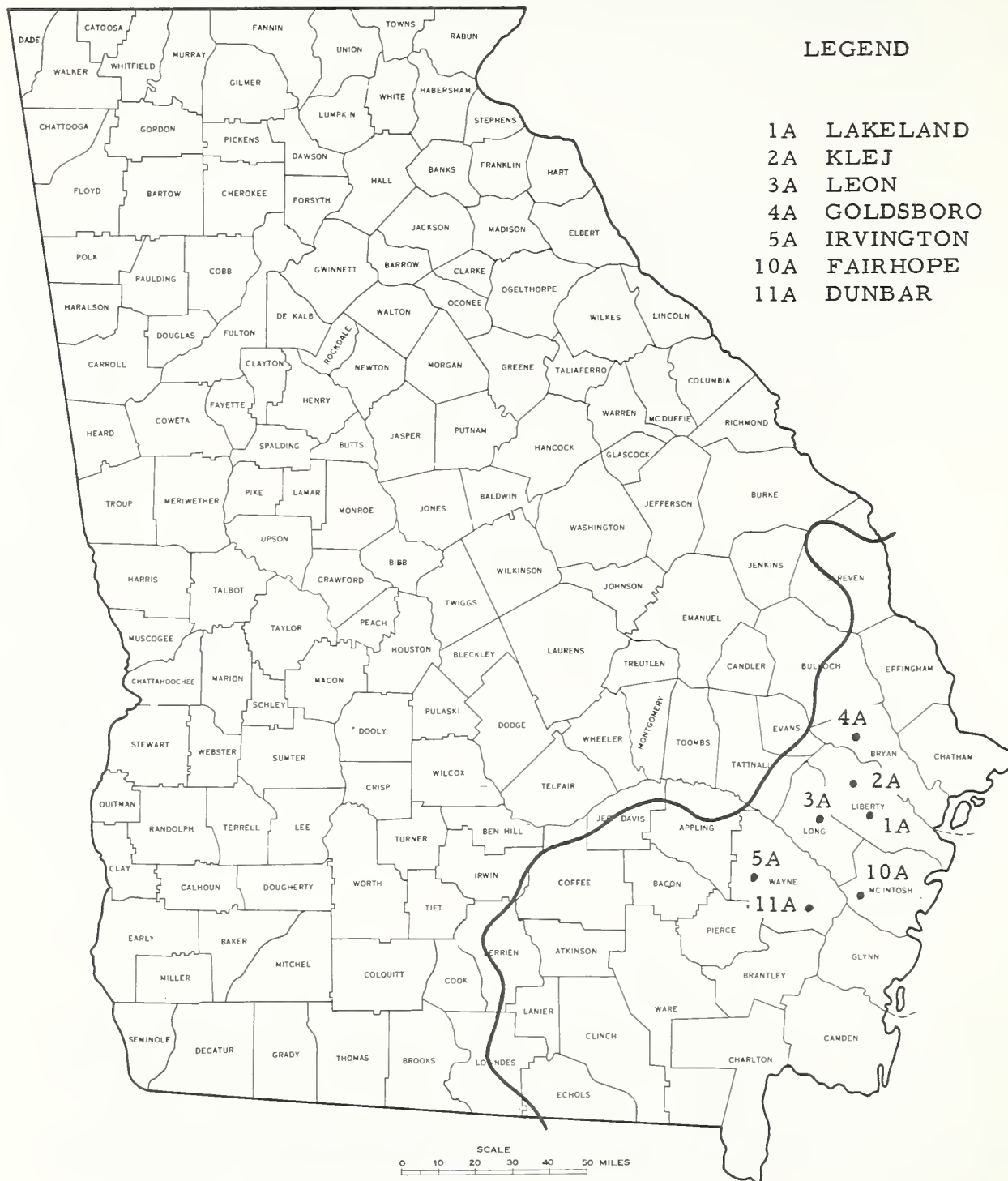


Figure 1.--Location of soils studied in Georgia; heavy line indicates boundary of Lower Coastal Plain.

SOUTH CAROLINA



Figure 2.--Location of soils studied in South Carolina; heavy line indicates boundary of Lower Coastal Plain.

core sampler was used to take samples for bulk density determinations. The cores were trimmed and placed in one-pint ice cream cartons for transport to the laboratory. In cases where the thickness of the horizon was less than the length of the core cylinder, or where the soil was very sandy, the bulk density samples were taken in 8-ounce tin cups. Samples for pH determinations were taken in one-quart polyethylene bags. Bulk bag samples were taken for moisture retention studies and mechanical analyses.

LABORATORY PROCEDURE

Immediately upon bringing the samples into the laboratory, pH determinations were made on the moist soil using a soil-water ratio of 1:1. The pH was determined electrometrically using a pH meter. The remaining sample was spread out and allowed to air-dry thoroughly, after which pH determinations were made again. The cores for bulk density were dried overnight in a forced draft oven at 110° C. and then weighed. Bulk density was calculated in the

usual manner by dividing the weight of the oven-dry soil, in grams, by the volume of the core in cubic centimeters. Samples for mechanical analyses and moisture retention studies were air-dried and passed through a 2-mm. sieve. The hydrometer method was used for mechanical analysis. Particle size ranges were 2.0 to 0.05 mm. for sand, 0.05 to 0.002 mm. for silt, and <0.002 for clay. A 1-normal solution of sodium hexametaphosphate was used as dispersing agent, with 5 milliliters to 100 grams of sand or to 50 grams of finer textured soils. The stirring time was 5 minutes for sands and 20 to 30 minutes for finer textured soils. This procedure did not separate the sand fractions into the various particle sizes for precise textural classification. Since the soils used in this study were predominantly sands or of a very sandy nature, the moisture retention studies were conducted on disturbed samples. Preliminary studies had shown essentially no difference in moisture retention by soils containing such a high percentage of sand when determinations were made on disturbed and undisturbed samples.

The pressure-membrane apparatus³ was utilized for the determination of the 15- and 4-atmosphere points on the moisture desorption curve. Pressure-plate apparatus⁴ was used for the 1-, 1/3-, and 1/10-atmosphere values. Triplicate samples of about 20 grams each were used on duplicate pressure membranes and on the pressure plates to obtain the values on the moisture desorption curve. The six values were averaged to obtain the values shown in the tables. The samples were removed from the pressure membranes at the end of 4 days and from the pressure plates at the end of 10 days. A previous time study indicated that this amount of time was required for most of these soils to reach equilibrium. After the samples had reached equilibrium, they were removed from the apparatus, placed in preweighed 6-oz. cans, weighed, dried overnight in a forced draft oven at 110° C., and reweighed. The percentage of moisture was calculated and expressed as percent by weight of dry soil. The available water was calculated and expressed on a volume basis in terms of inches of water per inch of soil. The calculations were as follows: (percentage of moisture by weight at 1/3 atm. minus percentage of moisture by weight at 15 atm.) X bulk density ÷ 100 = inches of water per inch of soil depth. The cumulative inches of water with depth is also shown in the tables.

RESULTS AND DISCUSSION

Table 1 summarizes the available water held in the top 3 feet of the various soil series. The Leon series held the least amount of water with only 0.64 inch in the 0- to 45-inch layer and Fairhope the most, with 3.14 inches in the 0- to 40-inch layer. However, it should be pointed out that the data represent results from only one site of each series. More sites of each series must be studied to determine the variability within soil series. Even though the Leon series held the least amount of available water, the so-called "hardpan" layer (14 to 18 inches thick) held 0.052 inch of water per inch of soil, which was about five times as much water per inch of depth in the top 14 inches and about twice as much as the 39- to 45-inch layer. The B₂₂ (34 to 42 inches thick) horizon of Weston held 0.136 inch of water per inch of soil, the most available water per inch of depth of any horizon of the series studied.

The soil physical properties and moisture determinations for the 11 soil samples are tabulated below. The data include bulk density, mechanical analysis, percent of moisture by weight at different tensions, and available moisture by horizons. The soil pH at time of sampling and after the sample was thoroughly air-dried was obtained. No significant change in pH occurred upon air-drying, which indicated that sulfur oxidation was not a problem in these coastal soils.

Profile descriptions of each soil site are given in the appendix.

³Richards, L. A. A pressure-membrane extraction apparatus for soil solution. *Soil Sci.* 51: 377-386. 1941.

⁴Richards, L. A. Methods of measuring soil moisture retention. *Soil Sci.* 68: 95-112. 1949.

TALBE 1.--Inches of available moisture¹ in the surface 3 feet and in the total depth of profile sampled for site A of the different soil series

Soil No.	Soil series	Total depth of soil profile	Available moisture	
			In 0- to 36-inch thickness	For total depth of profile
		<u>Inches</u>	<u>Inches</u>	<u>Inches</u>
1	Lakeland.....	0 to 59	0.98	1.94
2	Klej.....	0 to 52	1.00	1.62
3	Leon.....	0 to 45	.64	.81
4	Goldsboro....	0 to 60	1.64	2.99
5	Irvington....	0 to 46	.91	1.27
6	Kiawah.....	0 to 40	1.12	1.23
7	Edisto.....	0 to 50	1.47	2.13
8	Weston.....	0 to 60	3.08	5.83
9	Charleston...	0 to 52	1.25	1.78
10	Fairhope.....	0 to 40	3.14	3.40
11	Dunbar.....	0 to 48	2.32	3.75

¹ Available moisture is used here as the amount held in the soil between tensions of 1/3 atmosphere and 15 atmospheres. Determinations were made on samples of disturbed soil material.

PHYSICAL AND MOISTURE CHARACTERISTICS

Soil Sample 1A

Soil Type: Lakeland sand
 Classification: Regosol
 Area: Liberty County, Ga.

Parent Material: Sands over clays
 Topography: Level to slightly sloping
 Drainage: Well drained

Horizon	Depth	Bulk density	Water by weight at atmospheres tension of ----					Available moisture	
			1/10	1/3	1	4	15	Per inch	Cumulative
	<u>Inches</u>	<u>Gm/cc.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Inch</u>	<u>Inches</u>
A ₁ ...	0-4	1.33	11.39	6.86	5.35	3.90	2.96	0.052	0.21
C ₁ ...	4-16	1.50	4.63	2.45	1.91	1.33	1.04	.021	.46
C ₂ ...	16-37	1.68	6.32	3.54	2.88	2.34	2.00	.026	1.01
D ₁ ...	37-51	1.63	14.58	12.14	11.97	10.91	9.97	.035	1.50
D ₂ ...	51-59	1.61	22.44	17.32	17.09	15.48	13.91	.055	1.94

Horizon	Depth	pH		Mechanical analysis		
		Wet	Dry	Sand	Silt	Clay
	<u>Inches</u>			<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>
A ₁	0-4	4.71	4.78	89	8	3
C ₁	4-16	5.15	5.15	92	5	3
C ₂	16-37	5.48	5.29	90	3	7
D ₁	37-51	5.18	4.93	78	3	19
D ₂	51-59	5.03	4.92	66	7	27

PHYSICAL AND MOISTURE CHARACTERISTICS

Soil Sample 2A

Soil Type: Klej sand
 Classification: Regosol
 Area: Liberty County, Ga.

Parent Material: Sands overlying clays
 Topography: Level
 Drainage: Moderately well drained

Horizon	Depth	Bulk density	Water by weight at atmospheres tension of ----					Available moisture	
			1/10	1/3	1	4	15	Per inch	Cumulative

	<u>Inches</u>	<u>Gm/cc.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Inch</u>	<u>Inches</u>
A ₁	0-5	1.48	5.75	5.60	4.31	4.25	3.82	0.026	0.13
C ₁	5-21	1.55	3.43	3.14	2.29	1.74	1.28	.029	.59
C ₂	21-32	1.76	2.67	2.34	1.71	1.18	.85	.026	.88
D ₁	32-45	1.82	5.32	4.57	4.06	3.44	2.88	.031	1.28
D ₂	45-52	1.70	11.58	11.42	10.58	9.74	8.58	.048	1.62

Horizon	Depth	pH		Mechanical analyses		
		Wet	Dry	Sand	Silt	Clay
	<u>Inches</u>			<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>
A ₁	0-5	5.02	5.03	89	9	2
C ₁	5-21	5.20	5.21	91	6	3
C ₂	21-32	5.13	5.12	87	7	6
D ₁	32-45	5.14	5.10	83	6	11
D ₂	45-52	5.15	5.15	76	7	17

PHYSICAL AND MOISTURE CHARACTERISTICS

Soil Sample 3A

Soil Type: Leon fine sand
 Classification: Ground-Water Podzol
 Area: Long County, Ga.

Parent Material: Sands
 Topography: Level
 Drainage: Poorly drained

Horizon	Depth	Bulk density	Water by weight at atmospheres tension of ----					Available moisture	
			1/10	1/3	1	4	15	Per inch	Cumulative
	<u>Inches</u>	<u>Gm/cc.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Inch</u>	<u>Inches</u>
A ₁ ...	0-4	1.43	4.48	3.27	3.08	2.76	2.54	0.010	0.04
A ₂ ...	4-14	1.51	1.51	1.22	.92	.73	.56	.010	.14
B _{2h} ..	14-18	1.29	11.61	10.67	9.68	8.46	6.54	.052	.35
B ₃ ...	18-27	1.53	2.97	2.85	2.62	2.07	1.54	.020	.53
C ₁ ...	27-39	1.58	1.63	1.39	1.28	.95	.63	.012	.67
C ₂ ...	39-45+	1.74	3.56	3.10	3.01	2.33	1.77	.023	.81

Horizon	Depth	pH		Mechanical analyses		
		Wet	Dry	Sand	Silt	Clay
	<u>Inches</u>			<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>
A ₁	0-4	3.83	3.99	93	4	3
A ₂	4-14	4.27	4.52	94	3	3
B _{2h}	14-18	4.47	4.52	93	4	3
B ₃	18-27	4.95	4.89	93	3	4
C ₁	27-39	5.00	4.99	96	1	3
C ₂	39-45+	--	--	92	3	5

PHYSICAL AND MOISTURE CHARACTERISTICS

Soil Sample 4A

Soil Type: Goldsboro sand
 Classification: Red-Yellow Podzolic
 Area: Bryan County, Ga.

Parent Material: Sands and clay
 Topography: Level
 Drainage: Moderately well drained

Horizon	Depth	Bulk density	Water by weight at atmospheres tension of ----					Available moisture	
			1/10	1/3	1	4	15	Per inch	Cumulative
	<u>Inches</u>	<u>Gm/cc.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Inch</u>	<u>Inches</u>
A _p ...	0-7	1.60	3.70	3.32	2.97	2.20	1.55	0.028	0.20
A ₂ ...	7-13	1.62	3.20	3.06	2.89	2.45	1.92	.066	.59
B ₁ ...	13-24	1.69	8.67	7.99	7.44	6.71	5.81	.037	1.00
B ₂ ...	24-36	1.69	15.71	13.78	13.33	11.91	10.66	.053	1.64
B ₃ ...	36-46	1.56	16.21	14.35	13.87	12.23	11.09	.051	2.15
C....	46-60	1.50	19.44	17.18	16.52	14.87	13.15	.060	2.99

Horizon	Depth	pH		Mechanical analyses		
		Wet	Dry	Sand	Silt	Clay
	<u>Inches</u>			<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>
A _p	0-7	5.70	5.74	91	6	3
A ₂	7-13	5.00	5.02	87	7	6
B ₁	13-24	4.48	4.52	79	7	14
B ₂	24-36	5.23	5.08	71	7	22
B ₃	36-46	5.10	4.93	71	5	24
C.....	46-60	5.00	4.79	69	5	26

PHYSICAL AND MOISTURE CHARACTERISTICS

Soil Sample 5A

Soil Type: Irvington sand

Parent Material: Sands overlying clays

Classification: Red-Yellow Podzolic

Topography: Level

Area: Wayne County, Ga.

Drainage: Moderately well drained

Horizon	Depth	Bulk density	Water by weight at atmospheres tensions of ----					Available moisture	
			1/10	1/3	1	4	15	Per inch	Cumulative
	<u>Inches</u>	<u>Gm/cc.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Inch</u>	<u>Inches</u>
A ₁ ...	0-5	1.32	5.73	4.96	4.23	3.60	2.69	0.030	0.15
A ₂ ...	5-10	1.45	3.19	3.00	2.61	2.21	1.75	.018	.24
B ₁ ...	10-25	1.54	5.79	5.26	4.88	4.43	3.94	.020	.54
B ₂ ...	25-31	1.57	11.26	9.43	9.07	8.22	7.36	.032	.73
C....	31-46+	1.54	13.04	11.53	11.11	10.04	9.18	.036	1.27

Horizon	Depth	pH		Mechanical analyses		
		Wet	Dry	Sand	Silt	Clay
	<u>Inches</u>			<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>
A ₁	0-5	5.13	5.07	87	9	4
A ₂	5-10	5.80	5.64	87	8	5
B ₁	10-25	6.01	5.70	83	6	11
B ₂	25-31	5.65	5.29	76	4	20
C.....	31-46+	5.43	5.04	72	7	21

PHYSICAL AND MOISTURE CHARACTERISTICS

Soil Sample 6A

Soil Type: Kiawah sand

Classification: *

Area: Charleston County, S. C.

Parent Material: Sands

Topography: Level

Drainage: Somewhat poorly drained

Horizon	Depth	Bulk density	Water by weight at atmospheres tension of ----					Available moisture	
			1/10	1/3	1	4	15	Per inch	Cumulative
	<u>Inches</u>	<u>Gm/cc.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Inch</u>	<u>Inches</u>
A ₁ ...	0-10	1.33	5.56	4.64	4.20	3.59	2.60	0.027	0.27
A ₂ ...	10-15	1.53	5.60	4.45	4.00	3.43	2.54	.029	.42
B ₂₁ ..	15-20	1.55	6.37	5.19	4.74	4.11	3.16	.031	.57
B ₂₂ ...	20-32	1.52	6.78	6.28	5.95	4.91	3.88	.036	1.00
C.....	32-40+	1.52	5.17	4.90	4.64	3.81	3.01	.029	1.23

*Unclassified

Horizon	Depth	pH		Mechanical analyses		
		Wet	Dry	Sand	Silt	Clay
	<u>Inches</u>			<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>
A ₁	0-10	5.25	5.25	91	5	4
A ₂	10-15	5.66	5.62	90	5	5
B ₂₁	15-20	5.67	5.80	89	4	7
B ₂₂	20-32	6.43	6.49	88	4	8
C.....	32-40+	6.60	6.62	90	1	9

PHYSICAL AND MOISTURE CHARACTERISTICS

Soil Sample 7A

Soil Type: Edisto loamy sand
 Classification: Low-Humic Gley
 Area: Charleston County, S. C.

Parent Material: Sands and sandy
 clays

Topography: Level
 Drainage: Poorly drained

Horizon	Depth	Bulk density	Water by weight at atmospheres tension of ----					Available moisture	
			1/10	1/3	1	4	15	Per inch	Cumulative
	<u>Inches</u>	<u>Gm/cc.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Inch</u>	<u>Inches</u>
A _p ...	0-10	1.49	6.14	4.99	4.87	3.93	2.53	0.037	0.37
A ₂ ...	10-14	1.50	7.78	4.88	4.48	3.67	2.69	.033	.50
B ₂ ...	14-19	1.57	16.12	11.66	11.16	9.65	8.01	.057	.79
B ₃ ...	19-36	1.49	10.91	7.71	7.10	6.18	5.03	.040	1.47
C....	36-50	1.58	13.34	8.40	8.06	6.74	5.40	.047	2.13

Horizon	Depth	pH		Mechanical analyses		
		Wet	Dry	Sand	Silt	Clay
	<u>Inches</u>			<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>
A _p	0-10	5.57	5.43	79	16	5
A ₂	10-14	5.06	5.10	79	13	8
B ₂	14-19	5.07	5.10	68	12	20
B ₃	19-36	5.56	5.43	76	11	13
C.....	36-50	5.10	5.10	78	10	12

PHYSICAL AND MOISTURE CHARACTERISTICS

Soil Sample 8A

Soil Type: Weston Loamy sand
 Classification: Low-Humic Gley
 Area: Charleston County, S. C.

Parent Material: Sand and Sandy clays
 Topography: Level
 Drainage: Somewhat poorly drained

Horizon	Depth	Bulk density	Water by weight at atmospheres tension of ----					Available moisture	
			1/10	1/3	1	4	15	Per inch	Cumulative
	<u>Inches</u>	<u>Gm/cc.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Inch</u>	<u>Inches</u>
A _p ...	0-10	1.47	9.12	4.40	4.02	3.14	2.30	0.031	0.31
A ₂ ...	10-14	1.64	9.58	4.53	4.28	3.32	2.48	.034	.45
B ₂₁ ..	14-34	1.61	26.70	19.48	17.47	15.10	12.17	.118	2.81
B ₂₂ ..	34-42	1.66	---	19.12	16.52	13.91	10.90	.136	3.90
C....	42-60	1.63	---	14.31	12.32	10.14	7.74	.107	5.83

Horizon	Depth	pH		Mechanical analyses		
		Wet	Dry	Sand	Silt	Clay
	<u>Inches</u>			<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>
A _p	0-10	6.38	6.33	77	19	4
A ₂	10-14	5.79	5.68	72	22	6
B ₂₁	14-34	5.03	4.99	54	18	28
B ₂₂	34-42	5.28	5.25	50	26	24
C.....	42-60	6.82	6.76	63	18	16

PHYSICAL AND MOISTURE CHARACTERISTICS

Soil Sample 9A

Soil Type: Charleston sand Parent Material: Sands and sandy loams
 Classification: Red-Yellow Podzolic Topography: Level
 Area: Charleston County, S. C. Drainage: Moderately well drained

Horizon	Depth	Bulk density	Water by weight at atmospheres tension of ----					Available moisture	
			1/10	1/3	1	4	15	Per inch	Cumulative
	<u>Inches</u>	<u>Gm/cc.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Inch</u>	<u>Inches</u>
A ... p	0-8	1.42	7.54	5.99	5.83	5.16	3.69	0.033	0.26
A ₂ ...	8-16	1.55	5.11	4.03	3.71	3.13	2.40	.025	.46
B ₂ ...	16-24	1.63	13.13	10.84	10.40	9.35	7.96	.047	.84
B ₃₁ ..	24-36	1.66	8.49	6.78	6.48	5.67	4.73	.034	1.25
B ₃₂ ..	36-44	1.66	---	9.16	8.81	7.77	6.55	.043	1.59
C....	44-52+	1.52	---	7.80	7.57	7.08	6.19	.024	1.78

Horizon	Depth	pH		Mechanical analyses		
		Wet	Dry	Sand	Silt	Clay
	<u>Inches</u>			<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>
A p	0-8	5.55	5.47	87	8	5
A ₂	8-16	5.30	5.36	85	9	6
B ₂	16-24	5.29	5.20	73	8	19
B ₃₁	24-36	4.82	4.88	81	6	13
B ₃₂	36-44	4.57	4.61	79	5	16
C.....	44-52+	4.58	4.58	89	4	7

PHYSICAL AND MOISTURE CHARACTERISTICS

Soil Sample 10A

Soil Type: Fairhope fine sandy loam
 Classification: Red-Yellow Podzolic
 Area: McIntosh County, Ga.

Parent Material: Sand and clays
 Topography: Level
 Drainage: Moderately Well drained

Horizon	Depth	Bulk density	Water by weight at atmospheres tension of ----					Available moisture	
			1/10	1/3	1	4	15	Per inch	Cumulative
	<u>Inches</u>	<u>Gm/cc.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Inch</u>	<u>Inches</u>
A ₁ ...	0-1	1.23	25.48	11.70	9.06	7.23	5.17	0.080	0.08
A ₂ ...	1-8	1.48	16.71	6.01	5.44	3.92	2.62	.050	.43
B ₂₁ ...	8-10	1.45	20.95	13.09	11.19	9.46	7.29	.084	.60
B ₂₂ ...	10-24	1.28	---	32.11	30.92	27.41	23.20	.114	2.20
B ₃ ...	24-30	1.40	---	23.17	22.41	20.00	16.76	.090	2.74
C....	30-40+	1.64	---	14.59	13.84	12.51	10.58	.066	3.40

Horizon	Depth	pH		Mechanical analyses.		
		Wet	Dry	Sand	Silt	Clay
	<u>Inches</u>			<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>
A ₁	0-1	4.75	4.49	69	23	8
A ₂	1-8	5.28	5.02	69	22	9
B ₂₁	8-10	4.94	4.70	60	17	23
B ₂₂	10-24	4.97	4.74	32	11	57
B ₃	24-30	4.68	4.60	52	5	43
C.....	30-40+	4.72	4.58	71	2	27

PHYSICAL AND MOISTURE CHARACTERISTICS

Soil Sample 11A

Soil Type: Dunbar Loamy fine sand Parent Material: Fine-textured sediments
 Classification: Red-Yellow Podzolic Topography: Level
 Area: Wayne County, Ga. Drainage: Somewhat poorly drained

Horizon	Depth	Bulk density	Water by weight at atmospheres tension of ----					Available moisture	
			1/10	1/3	1	4	15	Per inch	Cumulative
	<u>Inches</u>	<u>Gm/cc.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Inch</u>	<u>Inches</u>
A ₁ ...	0-6	1.37	9.56	6.01	4.36	3.46	2.68	0.046	0.28
A ₂ ...	6-15	1.42	5.58	3.83	3.01	2.45	1.85	.028	.53
B ₁ ...	15-22	1.48	6.37	3.88	2.91	2.35	1.80	.031	.75
B _{2g} ..	22-30	1.57	28.89	20.00	18.44	15.34	12.76	.108	1.61
B _{3g} ..	30-48+	1.52	34.14	23.04	20.42	17.72	14.34	.119	3.75

Horizon	Depth	pH		Mechanical analyses		
		Wet	Dry	Sand	Silt	Clay
	<u>Inches</u>			<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>
A ₁	0-6	4.81	4.51	83	12	5
A ₂	6-15	5.41	5.08	85	8	7
B ₁	15-22	5.34	5.06	85	8	7
B _{2g}	22-30	5.43	4.86	61	10	29
B _{3g}	30-48+	5.26	4.81	51	14	35

APPENDIX

Soil Profile Descriptions

Following are soil profile descriptions for sites in this study.

<u>Soil Profile</u>	Lakeland sand.	Sample 1A.
A ₀	$\frac{1}{2}$ to 0	inch, thin cover of leaf mold, twigs, and decaying litter.
A ₁	0 to 4	inches, dark-gray (5Y 3/1) sand, dark gray (5Y 4/1) when dry; weak, fine, granular to structureless; very friable when moist; abrupt, smooth boundary.
C ₁	4 to 16	inches, light olive-brown (2.5Y 5/4) sand, pale yellow (5Y 7/3) when dry; single-grain structure; loose; diffuse, smooth boundary.
C ₂	16 to 37	inches, light yellowish-brown (10YR 6/4) sand, pale yellow (5Y 7/3) when dry; single-grain structure; loose; abrupt, wavy boundary.
D ₁	37 to 51	inches, yellowish-brown (10YR 5/6) sandy loam with soft, irregular-shaped lumps of strong-brown material (7.5YR 5/6) (5 to 10 mm.) easily crushed to a granular mass; massive and friable; abrupt, wavy boundary.
D ₂	51 to 59	inches, reticulately mottled, very pale-brown, and strong-brown sandy clay loam, mostly (10YR 7/3) and (7.5YR 5/6) in color, irregular-shaped soft lumps of red (7.5R 4/6) and dusky-red (7.5R 3/4) material (5 to 10 mm.), easily crushed to a granular mass; massive and friable.
<u>Soil Profile</u>	Klej sand.	Sample 2A.
A ₀	$\frac{1}{2}$ to 0	inch, thin cover of leaf mold, twigs, and decaying litter.
A ₁	0 to 5	inches, very dark-gray (10YR 3/1) sand, gray (N 5) when dry; weak, fine granular structure; very friable when moist; clear, smooth boundary.
C ₁	5 to 21	inches, grayish-brown (2.5Y 5/2) sand, color becomes slightly paler with depth, light gray (2.5Y 7/2) when dry; weak, medium granular to single-grain structure; very friable; distinct, smooth boundary.
C ₂	21 to 32	inches, mottled pale-olive (5Y 6/3) sand, pale yellow when dry, and yellowish-brown (10YR 5/6); mottles are few, faint, and distinct; weak, medium, granular to single-grain structure; very friable; gradual, smooth boundary.

- D₁ 32 to 45 inches, light brownish-gray loamy sand mottled yellowish-brown; mottles are common, medium, and distinct; contains many irregular-shaped, soft brown lumps (5-15 mm.) that are easily crushed into a granular mass; massive and friable; abrupt, wavy boundary.
- D₂ 45 to 52 inches, mottled gray and light yellowish-brown sandy loam with irregular-shaped soft lumps of strong-brown material (5 to 15 mm.), easily crushed to a granular mass; massive and friable.

Soil Profile Leon fine sand. Sample 3A.

- A₀ $\frac{1}{2}$ to 0 inch, thin cover of twigs, leaves, and decaying plant matter.
- A₁ 0 to 4 inches, dark-gray (N 4) fine sand, gray (N 5) when dry; structureless; loose when moist; abrupt, smooth boundary.
- A₂ 4 to 14 inches, white (N 8) fine sand; structureless; loose when moist; abrupt, smooth boundary.
- B_{2h} 14 to 18 inches, dark reddish-brown (5YR 3/3) to very dark-brown (10YR 2/2) fine sand; massive; firm; clear, wavy boundary.
- B₃ 18 to 27 inches, mottled pale-yellow (2.5Y 7/4) to dark yellowish-brown (10YR 4/4) fine sand; weak, fine, single-grain structure; very friable; gradual, wavy boundary.
- C₁ 27 to 39 inches, light brownish-gray (10YR 6/2) fine sand; structureless; loose; clear, wavy boundary.
- C₂ 39 to 45 inches+, brown (7.5YR 5/2) fine sand; structureless; loose.

Soil Profile Goldsboro sand. Sample 4A.

- A_p 0 to 7 inches, dark grayish-brown (2.5Y 4/2) sand, gray (5Y 5/1) when dry; weak, fine, granular structure; very friable when moist; abrupt, smooth boundary.
- A₂ 7 to 13 inches, olive-yellow (2.5Y 6/6) sand, light yellowish-brown (2.5Y 6/4) when dry; weak, fine, granular structure; very friable when moist; clear, wavy boundary.
- B₁ 13 to 24 inches, brownish-yellow (10YR 6/8) sandy loam, pale yellow (2.5Y 7/4) when dry; weak, fine, granular structure; very friable when moist; gradual, wavy boundary.
- B₂ 24 to 36 inches, light olive-brown (2.5Y 5/6) sandy clay loam, pale yellow (2.5Y 8/4) when dry; numerous irregular-shaped soft lumps, 5 to 15 mm. in size; lumps are easily crushed or broken open and are red (2.5YR 4/8) in the center grading to yellowish-brown (10YR 5/8) at the outer periphery; weak, fine, subangular blocky structure; friable when moist; gradual, wavy boundary.

- B₃ 36 to 46 inches, mottled yellowish-brown (10YR 5/6) sandy clay loam; yellow (10YR 7/6) and light gray (2.5Y 7/2) when dry; mottles are few, medium, and distinct; contains numerous irregular-shaped, soft, yellowish-brown lumps, 5 to 15 mm. in size, that are readily crushed to a granular mass; weak, medium, subangular blocky structure; friable when moist; gradual, wavy boundary.
- C 46 to 60 inches, mottled gray, yellow, and yellowish-brown sandy clay loam with irregular-shaped lumps of red material (15 to 25 mm.) easily crushed to a granular mass; massive and friable.

Soil Profile Irvington sand. Sample 5A.

- A₁ 0 to 5 inches, gray (N 5) sand, gray (5Y 5/1) when dry; structureless; loose; clear, wavy boundary.
- A₂ 5 to 10 inches, pale-brown (10YR 6/3) sand, light yellowish-brown (2.5Y 6/4) when dry; structureless; loose; a few small iron concretions (5 to 15 mm.); clear, wavy boundary.
- B₁ 10 to 25 inches, yellow (10YR 7/8) loamy sand, yellow (2.5Y 7/6) and gray (10YR 6/1) when dry; mottles are few, medium, and faint; weak, medium crumb structure; very friable; few iron concretions; gradual, wavy boundary.
- B₂ 25 to 31 inches, yellow (10YR 7/6) sandy clay loam, yellow (2.5Y 7/6), and brownish-yellow (10YR 6/8) and strong brown (7.5YR 5/8) when dry; mottles are few, medium, and faint; numerous iron concretions, weakly cemented with iron, that average about 50 mm. in diameter; weak, granular structure; very friable; gradual, wavy boundary.
- C 31 to 46 inches +, mottled yellow (10YR 7/8) sandy clay loam, pale yellow and very pale brown (10YR 7/4), strong brown (7.5YR 5/8), and yellowish-red (5YR 4/8) when dry; mottles are many medium and distinct; weak, fine, subangular blocky structure; friable.

Soil Profile Kiawah sand. Sample 6A.

- A₁ 0 to 10 inches, very dark grayish-brown (10YR 3/2) sand; weak, fine, granular structure; very friable; many fine roots; few medium and coarse, hard, strong-brown concretions; strongly acid; clear, smooth boundary.
- A₂ 10 to 15 inches, dark grayish-brown (10YR 4/2) sand; weak, fine, granular structure; very friable; many fine roots; few coarse, soft, yellowish-brown concretions; medium acid; gradual, smooth boundary.
- B₂₁ 15 to 20 inches, dark-brown (10YR 3/3) sand with few, medium, distinct mottles of yellowish-brown (10YR 5/8); weak, fine, granular structure; very friable; few, fine roots; and few, fine, firm pores; strong-brown concretions; medium acid; gradual, smooth boundary.

- B₂₂ 20 to 32 inches, grayish-brown (10YR 5/2) and dark grayish-brown (10YR 4/2) loamy sand with common, medium, faint mottles of yellowish-brown (10YR 5/4); weak, fine, granular structure; very friable; few, fine, medium, and coarse roots; hard, dark reddish-brown concretions; slightly acid; gradual, wavy boundary.
- C 32 to 40 inches+, light-gray (10YR 7/1), strong-brown (7.5YR 5/8), and yellowish-brown (10YR 5/6) loamy sand; structureless; loose to very friable; few, soft, dark reddish-brown concretions.

Soil Profile Edisto loamy sand. Sample 7A.

- A_p 0 to 10 inches, very dark grayish-brown (10YR 3/2), light loamy sand; weak, fine, granular structure; very friable; many plant roots; small (5 to 15 mm.), strong-brown (7.5YR 5/8) (exterior) and dark-red (2.5YR 3/6) (interior) firm concretions; medium acid; clear, smooth boundary.
- A₂ 10 to 14 inches, pale-brown (10YR 6/3) light loamy sand; weak, fine, granular structure; very friable; numerous, fine pores and rootholes with dark-brown organic matter filling larger holes and strong-brown staining around fine rootholes; few, small, firm concretions; strongly acid; clear, wavy boundary.
- B₂ 14 to 19 inches, light olive-brown (2.5Y 5/4) light sandy clay loam with common, fine, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; very friable; many fine and few medium pores with strong brown staining around larger pores; common, medium, firm concretions; strongly acid; gradual wavy boundary.
- B₃ 19 to 36 inches, light brownish-gray (10YR 6/2) sandy loam with common, medium-faint, yellowish-brown (10YR 5/6) and many, medium, faint-brown (10YR 5/3) mottles; weak, medium, subangular blocky structure; friable; some fine roots; many fine pores stained with strong-brown color; small (5 to 15 mm.) irregular-shaped, soft, reddish-brown concretions in lower part of horizon; medium acid; gradual, irregular boundary.
- C 36 to 50 inches+, gray (10YR 6/1), pale-brown (10YR 6/3), and yellow (10YR 5/6) sandy loam and pockets of sand; massive in structure; friable; some fine-stained pores and root holes; strongly acid; no concretions observed.

Soil Profile Weston loamy sand. Sample 8A.

- A_p 0 to 10 inches, dark grayish-brown (10YR 4/2) loamy sand; weak, fine, granular structure; very friable; many, fine roots; slightly acid; abrupt, smooth boundary.
- A₂ 10 to 14 inches, light brownish-gray (10YR 6/2) sandy loam; few, distinct, medium, yellowish-brown (10YR 5/6) mottles; weak, fine, granular structure; very friable; few, fine roots; few, fine, soft, dark reddish-brown (5YR 3/3) concretions; medium acid; clear, smooth boundary.

- B₂₁ 14 to 34 inches, gray (10YR 5/1) sandy clay loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; firm when moist; hard when dry; clay film on vertical and horizontal ped faces; plentiful, fine pores and root holes; very strongly acid; gradual, smooth boundary.
- B₂₂ 34 to 42 inches, gray (10YR 6/1) sandy clay loam; many, coarse, distinct, yellowish-brown (10YR 5/6) mottles, and a few, fine, distinct, strong, brown (7.5YR 5/6); weak, coarse, subangular blocky structure; firm consistence when moist, hard when dry; few, patchy clay films on vertical ped faces; few, fine roots and fine pores; few, fine, dark reddish-brown, soft concretions; strongly acid; gradual, smooth boundary.
- C 42 to 60 inches, gray (10YR 6/1) sandy loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles, and few, fine, distinct, strong brown (7.5YR 5/6); massive structure; firm consistence when moist, hard when dry; few, fine root holes and pores; few, fine, dark reddish-brown, soft concretions.

Soil Profile Charleston sand. Sample 9A.

- A_p 0 to 8 inches, dark-brown (10YR 3/3) sand; weak, fine, granular structure; very friable; many, fine roots; few, fine and medium, firm and hard, strong-brown to dark-brown concretions; medium acid; clear, smooth boundary.
- A₂ 8 to 16 inches, yellowish-brown (10YR 5/4) loamy sand; weak, fine, granular structure; very friable; few, fine roots; many, fine pores; few, root holes filled with dark material from horizon above; strongly acid; clear, smooth boundary.
- B₂ 16 to 24 inches, brown (7.5YR 4/4) light sandy clay loam; weak, medium to coarse, subangular blocky structure; friable; patchy clay films on vertical ped faces; few, fine roots; many, fine, and medium pores; few, fine, soft, dark-brown concretions; strongly acid; clear, smooth boundary.
- B₃₁ 24 to 36 inches, yellowish-brown (10YR 5/4) sandy loam with common, medium, distinct mottles of light brownish gray (10YR 6/2), and few, fine, prominent, yellowish-red (5YR 4/8); weak, medium, subangular blocky structure; friable; few, patchy clay films on vertical ped faces; many, fine roots; many, fine pores; few, fine, soft, dark-brown concretions rounded, in lower part; very strongly acid; gradual, wavy boundary.
- B₃₂ 36 to 44 inches, yellowish-brown (10YR 5/6) sandy loam with common, medium, distinct mottles of strong brown (7.5YR 5/6) and light brownish-gray (10YR 6/2); weak, medium, subangular blocky structure; friable; few, fine roots; few, fine pores; some fine, soft, dark-brown concretions; very strongly acid; gradual, wavy boundary.
- C 44 to 52 inches, pale-brown (10YR 6/3) and pale-olive (5Y 6/3) sand; very friable; few, fine roots; few, fine pores; common, medium (15 to 25 mm.) soft, very strong, brown concretions; irregular shaped; very strongly acid.

Soil Profile Fairhope fine sandy loam. Sample 10A.

- A₀ 1 to 0 inch, thin cover of leaf mold and decaying plant material.
- A₁ 0 to 1 inch, very dark-gray (10YR 3/1) fine sandy loam, dark gray (10YR 4/1) when dry; moderate, medium granular structure; very friable when moist, soft when dry; abrupt, wavy boundary.
- A₂ 1 to 8 inches, dark yellowish-brown (10YR 4/4) fine sandy loam, yellowish-brown (10YR 5/4) when dry; moderate, medium granular structure; very friable when moist; abrupt, wavy boundary.
- B₂₁ 8 to 10 inches, red (2.5YR 4/6) sandy clay loam, red (2.5YR 5/6) when dry; strong, medium, angular blocky structure; very firm when moist; abrupt, smooth boundary.
- B₂₂ 10 to 24 inches, mottled red (2.5YR 4/6) and grayish-brown (10 YR 5/2) clay; mottles are common, medium, and prominent; strong, medium, angular blocky structure; very firm when moist; abrupt, wavy boundary.
- B₃ 24 to 30 inches, mottled red (2.5YR 4/6), grayish-brown (10YR 5/2), and dark-red (7.5R 3/8) sandy clay; strong, medium, angular blocky structure; very firm; abrupt, wavy boundary.
- C 30 to 40 inches +, mottled red (2.5YR 4/6), grayish-brown (10YR 5/2), and brownish-yellow (10YR 6/8) sandy clay loam; massive, very firm.

Soil Profile Dunbar Loamy fine sand. Sample 11A.

- A₁ 0 to 6 inches, very dark-gray (N 3) loamy fine sand; weak, medium crumb structure; very friable; numerous roots; very strongly acid; clear, smooth boundary.
- A₂ 6 to 15 inches, pale-yellow (2.5Y 8/4) loamy fine sand; few root stains are reddish-yellow (7.5YR 6/8); weak, medium crumb structure; very friable; very strongly acid; clear, smooth boundary.
- B₁ 15 to 22 inches, yellowish-brown (10YR 5/8) loamy fine sand; few, fine, faint mottles of yellow (10YR 7/6); weak, medium, subangular blocky structure; friable; very strongly acid; gradual, wavy boundary.
- B_{2g} 22 to 30 inches, mottled gray (5Y 6/1), yellowish-brown (10YR 5/8), and red (10R 4/6) sandy clay loam; mottles are many, medium, and prominent; moderate, medium, subangular blocky structure; firm; very strongly acid; gradual, wavy boundary.
- B_{3g} 30 to 48 inches +, mottled gray (N 5), strong-brown (7.5YR 5/8), and red (10R 4/6) sandy clay; many coarse and prominent mottles; moderate, medium, angular blocky structure; very firm; free water; very strongly acid.

